

***CLOUD RESOLVING SIMULATIONS USING THE WRF  
MODEL DRIVEN BY LARGE-SCALE FORCINGS***

Satoshi Endo, Yangang Liu, Wuyin Lin, and Gang Liu

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**Environmental Sciences Department/Atmospheric Sciences Division  
Brookhaven National Laboratory**

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**ABSTRACT**

Cloud-resolving model (CRM) and large-eddy simulation (LES) have been demonstrated to be an effective tool in the evaluation and development of parameterizations of various fast processes in climate models. The Weather Research and Forecasting (WRF) model can be used as a LES model. However, the default WRF-LES is not suited for the cloud resolving simulation with large-scale forcings. Under the FAsT-physics System TESTbed and Research (FASTER) project, we extend the capability of WRF-LES to simulate clouds with time-varying large-scale and surface forcings, and evaluate simulations by the modified WRF (WRF-FASTER) against observations and other model's results. First, the WRF-FASTER is evaluated by well-tested continental cumulus case at ARM Southern Great Plains (SGP) site in GCSS model inter-comparison studies. The shallow cumulus clouds produced by WRF-FASTER has very similar properties to another LES model in terms of the diurnal variation (Figure) and vertical profiles of mean state and turbulent moments. Second, the simulations with continuous forcings are tested using the data in Cloud IOP in March 2000 at ARM SGP. WRF-FASTER roughly follows the time variation of observed cloud pattern but also shows mis- and over-predictions of cloud fraction, which also have been seen in the previous simulations of other CRMs. Further evaluation will be performed using nocturnal drizzling stratocumulus case based on the second research flight of the DYCOMS-II project.